V. TECHNICAL PAPER

POWER SPECTRUM OF THE ELF BAND OF THE NATURAL ELECTROMAGNETIC FIELD MEASURED IN POLAND

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There has been an increasing interest in the study of ELF electromagnetic phenomena in recent years. These studies are severely hindered by noises of different origin appearing on ELF-records. An investigation of this field is only there suitable where appropriate computer capacity is available.

During a stay in Poland we could see the method used in the Belsk Observatory for the record of ELF. The instruments used for this purpose are:

1. Ultra-violet recorder, made in England (SE Laboratories, Type SE 2005), with six galvanometers of different sensitivity. The paper speed and time-marks can be changed in a wide range. The recording is made on light-sensible paper, developed by sunshine.

2. Six-channel amplifier and recorder (constructed at the Geophysical Institute of the Polisch Academy of Sciences). The apparatus makes an amplification of 40 dB possible.

3. Oscillator.

4. Low-frequency tone generator.

Records of the Belsk induction coils were digitalized. The appearance of variations in the frequency band of 1 to 20 cps has been visually determined, and in such cases the recorder started. The noise level was rather high. Recording was made if the level of microvariations was more than 2 to 3-times that of the noise level. VLADIMIROV and KLEIMENOVA have shown (1) that the average level of the horizontal electric components is 0,1—,12 mV/km, that of the magnetic components is 0,01 gamma.

From the independently recorded magnetic and electric components data sets of 500 points each were chosen with a digitalization interval of 10^{-2} sec, thus each sample was 5 sec long. Power spectra have been computed by means

of a Polish computer type ODRA. These spectra can be seen on Fig. 1. In order to diminish random scattering in the spectra, an average spectrum has been determined (Fig. 2.) where four spectral peaks are prominent. These peaks are in accordance with the peaks given by BALSER and WAGNER (2) in the same domain. (Table 1.)

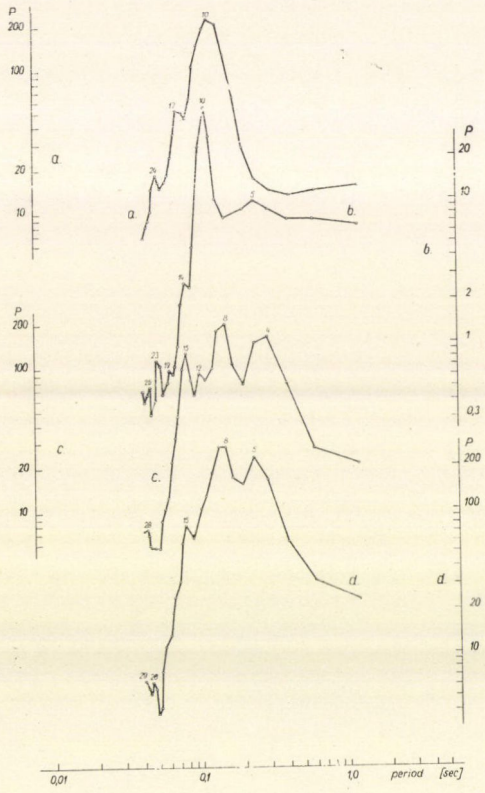

Fig. 1. Power spectra a—b) for magnetic components
c—d) for telluric components

The ultra-violet recorder is used in the Polish Geophisical Instute for the recording of microseisms.

The present experiment shows that it would be suitable for the investigation of the microstructure of the electromagnetic field of the Earth.

Table I.

n	f (c/s)	f (c/s) Balser—Wagner
1.	3,33	
2.	7,50	7,80
3.	12,50	14,10
4.	20,00	20,30
5.		26,40
6.		32,50

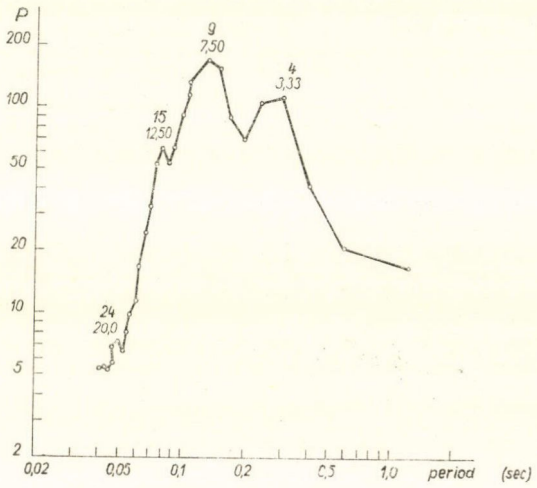

Fig. 2. Means spectrum of all components

ÁDÁM and BENCZE (3) have investigated the ELF band of the vertical electric component of the natural electromagnetic field. They concluded that there is a transition frequency band between variations of hydromagnetic origin and those propagating in the cavity between ionosphere and the Earth's surface and having a terrestrial origin. It would be very important also for the magnetotelluric method to investigate the ELF and ULF bands as detailed data on the strata above 1000 m can be only found by this method using these periods. ÁDÁM and BENCZE presented their instrument, too, which at present in an experimental stadium. A further aim of these measurements would be the investigation of the stability of the field at these periods, as there exist problems as regards the source and the propagation of these waves. The recording of pc 1-pulsations could be carried out by this method too.

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